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USSR Report

CONSTRUCTION AND EQUIPMENT

No. 29

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26 February 1981

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On behalf of all of us in FBIS I wish to express appreciation to our readers who have guided our efforts throughout the years.

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CONSTRUCTION

MINISTER OF INSTALLATION, SPECIAL CONSTRUCTION REVIEWS WORK OPPORTUNITIES

Moscow KRASNAYA ZVEZDA in Russian 28 Oct 80 p 4

[Interview with B. V. Bakin, USSR minister of installation and special construction work, Hero of Socialist Labor: "The Work Outlook for Construction Workers"]

> [Text] The large army of construction workers, millions strong, is making an enormous contribution to carrying out the decisions of the 25th CPSU Congress and consolidating the material-technical base of communism. At the request of our KRASNAYA ZVEZDA correspondent, B. V. Bakin, USSR Minister of Installation and Special Construction Work and Hero of Socialist Labor, tells how these workers are planning to celebrate the 26th congress of our Leninist party in a worthy fashion.

[Question] The document "Basic Directions of Development of the USSR National Economy for 1976-1980" envisioned a significant reduction in construction time. Could you tell us, please, Boris Vladimirovich, of the contribution of the employees of your sector to performance of this important task.

[Answer] In our country, as the recently ended session of the USSR Supreme Soviet observed, a vast program of capital construction is underway. This year alone the volume of capital investment will be 134 billion rubles.

The 10th Five-Year Plan is seeing large increases in capacities for the production of electricity, metal, mineral fertilizers, petrochemicals, motor vehicles, and consumer goods. Among the many new facilities that have been launched are the Orenburg gas refinery, the complex to produce nitrilacrylic acid at the Saratov Nitron Production Association, the complex to produce ammonia and nitrogen fertilizer at the Gorlovka Stirol Production Association, the oxygen convertor shop at the Nizhne-Tagil' Metallurgical Combine imeni V. I. Lenin, the Bogatyr' strip mine of the Ekibastuzugol' [Ekibastuz Coal] Production Association, and the shop to produce sheet metal at the Novolipetskiy Metallurgical Plant.

General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet L. I. Brezhnev congratulated construction, installation, and operations workers and planners on successful completion of these projects.

The second phase of the Kama Truck Plant will go on line this year, as will the Nadezhdinskiy Metallurgical Plant in Noril'sk, the Bukhara Cotton Fabric Combine, and many others. In the concluding year of the five-year plan a total of some 800 large facilities and installations are to be turned over for operations.

The increased level of industrialization of installation work is a characteristic of the present five-year plan. Massive-block installation, which has made it possible to cut back sharply on assembly operations at high levels, has become the primary method of installing equipment, pipelines, and design components. Introduction of an even more productive installation technique has begun: the use of so-called "aggregated" blocks. All these things demanded that we build fundamentally new hoisting equipment. We have organized the manufacture of installation cranes that can lift up to 160 tons and rigging gear for hoisting up to 1,000 tons.

With such installation equipment at our disposal, we can now install equipment of practically any dimensions and weight.

A few years ago it would probably have seemed impossible that a heavy-duty convertor weighing roughly 1,500 tons could be installed in its planned place at the Cherepovets Metallurgical Plant imeni 50-Letiya SSSR in just four hours. The brigade of Honored Construction Worker of the RSFSR A. Myshenkov of the Metallurgprokatmontazh [Metallurgical Rolled Metal Installation] Trust was able to do this using a special jack device.

I could cite many examples of similarly bold technical concepts and innovative work methods to reduce installation time. When enterprising engineers and workers who love their jobs go to work, you can always count on success. A 450-ton pouring crane had to be assembled at the same Cherepovets Metallurgical Plant.

Three installation brigades, the brigade of I. Sokolov from the Metallurgprokatmontazh Trust, the brigade of V. Musatov from the Sevzapelektromontazh [Northwestern Electrical Installation] Trust, and the brigade of V. Timashkov of the Cherepovetsstal'konstruktsiya [Cherepovets Steel Design Component] Trust, concluded an agreement for a comprehensive brigade contract. They did the job in just two months, twice as fast as the normative time, and saved 450 worker-days of labor. They did the job with 29 workers instead of the 34 envisioned in the agreement. The board of directors of the ministry approved this brigade contract technique and recommended it for broad dissemination.

The "worker relay," brigade contract, and other progressive forms of socialist competition generated by the initiative of our engineers and workers spread even more widely at construction projects in the country during the 10th Five-Year Plan.

[Question] Many readers ask KRASNAYA ZVEZDA to tell about the construction occupations that are essential to the country today. What can you tell them?

[Answer] As they say, all occupations are important. One of them is the occupation of installation worker. At one time there were very few. Industrial enterprises were built of wood or brick then, and the equipment was simple.

But now time has passed. The picture today is entirely different. Our ministry now has 222 large trusts, 34 planning-design and scientific research institutes, and 312 industrial enterprises to manufacture metal construction components, tanks, power cranes, and other products. The army of installation and construction workers in the most varied specializations numbers almost 1 million in our ministry alone.

They are resolving all kinds of technical problems today at the largest construction sites of metallurgy, chemicals, machine building, petroleum refining, and light and food industry. They install industrial equipment, rig up the most sophisticated automated systems, assemble unique power supply circuits, and perform sanitary engineering and heat insulation work. The name of the ministry includes the words "special construction work," and our subdivisions do just that. They carry on prospecting work deep underground, build smokestacks up to 300 meters high (and plans already envision heights of more than 400 meters), and they do much more.

The increased complexity of installation work has fundamentally changed the very concept of this occupation. It now assumes a person of great technical sophistication who can read drawings of automated devices without difficulty and has mastered the latest methods of detecting welding defects. In short, the installation worker today could be called an intellectual in working clothes.

We have a large detachment of regular, highly qualified workers today. Among them are Heroes of Socialist Labor Ye. Valuyev, S. Yarovoy, M. Klyagin, and A. Zakharov, winners of the USSR State Prize Yu. Shchekalev, N. Panyushkin, A. Khorokhorin, and many others. Their working biographies are similar in many respects: study at vocational-technical school, service in the army, Komsomol pass to shock construction projects, and unselfish labor for the good of the homeland.

Incidentally, we welcome soldiers discharged into the reserve at our construction sites. The occupation of installation worker can be learned at 18 large training combines, 190 vocational-technical schools, and 16 installation tekhnikums in many different cities. These educational institutions have organized special accelerated training groups for reserve military men who want to work in construction. In these courses they can become an installation worker in their favored specialization in 8-10 months while receiving a stipend at the rate of a grade I worker.

[Question] Boris Vladimirovich, tell us, please, about the "geography" of your sector. Where would you recommend that military men discharged into the reserve go to find work, to which construction projects of the 11 Five-Year Plan?

[Answer] No other sector of the economy, perhaps, is developing as fast as construction. The annual volume of capital investment exceeds 100 billion rubles, and it will continue to grow in the future. In 1981, for example, the total will be more than 124 billion rubles. New cities, territorial industrial complexes, and regional fuel-energy centers will appear. It will be a great joy to have a part in building them.

Young people today have a right to select any of the new projects: the mining and concentrating plants in the Ukraine and the Russian Federation or the metallurgical enterprises in Novokuznetsk Cherepovets, Karaganda, and Lipetsk. Reserve military men have an opportunity to settle in the cities of Almalyk and Fergana in the Uzbek SSR, Yefremovo in Tul'skaya Oblast, and Kazan'. These are the cities in which major chemical construction projects will unfold during the 11th Five-Year Plan. Large new construction is planned for the regions of the Far East and Siberia. Among these I could mention the Achinsk Petroleum Refinery in Krasnoyarskiy Kray, the Amur Pulp and Paper Combine, the Nadezhdinskiy Metallurgical Plant in Noril'sk, the Neryungri Concentrating Factory, and many others. In the new Five-Year Plan we will be expanding and building from scratch thousands of large enterprises throughout our entire country.

Wherever the fighting men discharged into the reserve may work in the future they will always be on the forward edge of peaceful labor, carrying out the party's great plans for economic and social development of our country's economy. We are waiting for military men discharged into the reserve at the construction sites of the 11th Five-Year Plan.

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CONSTRUCTION

INTERVIEW WITH KAZAKH SSR GOSSTROY CHAIRMAN

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 3 Jan 81 p 1

[Article by Anet Imanakyshevich Bektemisov, chairman of Kazakh SSR Gosstroy]

> [Text] Kazakhstan is sometimes called the country's largest construction site. There is every reason to call it that. Indeed, Kazakhstan is first among the USSR republics in rate of growth in volume of capital construction. During the 10th Five-Year Plan about 37 billion rubles was invested in the republic's economy. This enormous sum was spent for development of the economy and furtherance of the material and cultural standard of living of the working people.
>
> A large program of constructive work has been outlined for the 11th Five-Year Plan as well. We are publishing today a schematic map that shows a few of the new construction projects for 1981-1985. But even this rough diagram gives an impressive idea of the diversity of current construction. Carrying out this program means that new enterprises in ferrous metallurgy, petroleum refining, and the fuel and chemical industries, and new hydro and thermal power plants will start up. It means that the republic will have even more well-built roads, residential buildings, and cultural-domestic enterprises.
>
> The 10th Five-Year Plan is now history. What did it produce in the construction field? What are the immediate challenges of the first year of the 11th Five-Year Plan? What are the prospects for capital construction in general; a correspondent of KAZAKHSTANSKAYA PRAVDA addressed these questions to Anet Imanakyshevich Bektemisov, chairman of the Kazakh SSR Gosstroy [State Committee for Construction Affairs]. Here is his answer:

There is no need to prove the enormous role of capital construction under current conditions. The November 1980 Plenum of the CPSU Central Committee and the draft document of the Central Committee entitled "Basic Directions of

Economic and Social Development of the USSR for 1981-1985 and for the Period Until 1990" set this as a paramount task. Through the will of the party and the desire of the people entire cities are rising and the industrial map of the republic is changing radically. The 10th Five-Year Plan was unique in this sense. Suffice it to say that the total volume of capital investment in the economy was about 37 billion rubles. Almost 300 large new enterprises and capacities at already-existing enterprises were launched. The population received more than 30 million square meters of housing and hundreds of social and domestic facilities.

The power industry, nonferrous metallurgy, the fuel industry, light industry, agriculture, and several other sectors received notable additions. Let us take the power industry for just one example.

Two unique power generating units with capacities of 500,000 kilowatts apiece were brought on line at the Ekibastuz State Regional Power Plant No 1. This marked the beginning of the Ekibastuz fuel-energy complex with a total capacity of 20 million kilowatts. Our republic has never before known power construction on such a scale. New turbines at the Alma-Ata and Tselinograd thermal power plants are already producing electricity. The electricity transmission system has been significantly expanded. Almost 10,000 kilometers of new power lines with voltages of 35 kilovolts and more were installed. Many lines for electrification of agriculture and many large step-down transformer stations appeared.

It is simply not possible now to tell in detail of the enormous volume of work done by construction workers of the republic in the last five-year plan. Therefore I will just give a few facts. Among the enterprises that were launched and are now successfully producing output are the Pavlodar Petroleum Refinery, the Novodzhambulskiy Phosphorus Plant, the Zhezkentskiy Mining and Concentrating Combine, the Ust-Kamenogorsk Silk Fabric Combine, and the Kazakh Gas Refinery. The seventh coke battery at the Karaganda Metallurgical Combine was successfully launched and the Bogatyr' strip mine of the Ekibastuzugol' Association reached its full projected capacity of 50 million tons of fuel a year. The Pavlodar Tractor Plant imeni V. I. Lenin Association and the Tselinograd Association for Production of Antierosion Machinery were strengthened, as were the mines of the Leninogorsk Polymetallic Combine and the Zhanatas Mine Chemical Administration, many enterprises of the building materials industry, petroleum refining, and light industry.

These achievements afforded a good foundation for fulfilling the capital construction plans this year and in the 11th Five-Year Plan as a whole. These plans are even more difficult and demanding. This year alone the projected volume of capital construction is at least five billion rubles. A significant part of this capital is going to further the build-up of heavy, power, food, and light industry. Continued developement of the Pavlodar-Ekibastuz, Mangyshlak, Karatau-Dzhambul, and Karaganda territorial production complexes will be a focus of attention as it was during the last five-year plan. Construction is continuing on Ekibastuz State Regional Power Plant No 1 and full-scale work will begin on No 2, as well as Novoshul'binskaya Hydroelectric Power Plant in Semipalatinskaya Oblast. The following new capacities should go into operation: petroleum refining at Kenkiyaskiy; mining chemical — at the Chilisayskiy deposit, the East Kazakhstan copper chemical combine, the Leninogorsk Polymetallic Combine, the Sokolovsko-Sarbayskiy Mining and Concentrating Combine, the Ust'-Kamenogorsk Silk Fabric Combine, the Pavlodar Tractor Association, and the Chimkent Fosfor Chemical Association.

Among the priority projects of the first year of the 11th Five-Year Plan we may also mention the thermal electric power plant of the petroleum refinery and the second phase of the rubber-asbestos combine in Chimkent, food industry enterprises in Zyryanovsk, Alma-Ata, and Arkalyk, the tin shop at the Karaganda Metallurgical Combine, and the Aktyubinsk Primary Wool Processing Factory. Plans call for introducing more than 5 million square meters of housing.

Before I stop this far-from-complete story, I want to dwell briefly on the general tasks of capital construction in the republic. It should be observed first of all that the current five-year plan will be a time of struggle for maximum increase in the efficiency of capital investment. This means that attention is being focused on projects whose construction will give the fastest economic return. For this reason the number of new enterprises to be launched in the various sectors has been curtailed slightly, but the volume of construction at already operating production sites will go up sharply. Suffice it to say that the cost of this work will be half of all capital investment. In light of the demands contained in the decree of the CPSU Central Committee and USSR Council of Ministers entitled "Improving Planning and Strengthening the Influence of the Economic Mechanism of Raising Production Efficiency and Work Quality," the policy of concentrating material-technical resources in the sector will continue. Cutting back the number of construction projects underway at one time should have a good impact on accelerating the pace of work. In addition, intensifying the campaign for scientific-technical progress, industrialization of production, improving design work, broad use of new materials and designs, and carrying out major organizational measures will enable the construction workers of Kazakhstan to eliminate existing shortcomings in the sector quickly and successfully meet the challenges of carrying out the construction program of the 11th Five-Year Plan.

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MODULAR UNIT CONSTRUCTION METHOD WORKING WELL IN REMOTE REGIONS

Moscow IZVESTIYA in Russian 19 Nov 80 p 3

[Article by Yu. Batalin, deputy minister of construction of petroleum and gas industry enterprises: "Putting Up Worker Communities Quickly"]

[Text] In recent years workers of the Ministry of Construction of Petroleum and Gas Industry Enterprises have cut the time required to build facilities to one-third or one-quarter of the former time and raised labor productivity significantly. This has been possible thanks to broad practical introduction of the progressive modular unit method of construction. Various structures are manufactured at modular unit enterprises in the form of large three-dimensional modules. They are delivered to the sites and installed on foundations prepared for them. Whereas hundreds of specialists from the most diverse occupations used to work at construction sites, masonry workers, plasterers, concrete workers, and others, today one sees just small brigades of skilled installation workers.

Application of the new construction method is most efficient in unsettled regions that are being developed for the first time, especially in the eastern part of the country. The tour-of-duty system is widely used there. The brigade spends three weeks at a remote site, then one week at home with their families. On the organizational level our ministry has adopted the policy of forming comprehensive cost accounting (khozraschet) brigades which are headed, depending on the complexity of the work, by a foreman or a work supervisor. The brigades form party, trade union, and Komsomol cells. Thus, the modular unit method makes it possible to solve important social problems in addition to providing excellent results in accomplishing production tasks. The job of a construction worker is becoming increasingly attractive.

The ministry has now developed and is carrying out a special-purpose science-production program to develop the modular unit method of construction. By 1985 the scale of construction work using this method will increase several-fold.

The ministry has also accumulated interesting know-how in the use of the modular unit method to build housing and cultural-domestic facilities. For example, the sector has developed and incorporated the production of sets of units that include dormitories, apartments, medical stations, warm-up buildings for a brigade of up to 12 people, mobile dining halls, and sanitary facilities with shower stalls and a dry steam room. Each unit has its own running gear and can be delivered quickly to a work site. The full factory readiness of the traveling units and the fact that they are equipped with all necessary engineering facilities, furniture, and domestic articles makes it possible to create good living conditions on the line within just a few hours after the workers arrive at the new construction site.

But it is no longer adequate today to provide workers at a remote construction site with just good housing. The ministry has adopted a policy of creating the best cultural and living conditions for brigades employed in building up and exploiting petroleum and gas deposits. Our experimental design bureau has developed the design for a 40-person living complex for workers during their tour of duty. The complex has 18 three-dimensional units. The assortment of auxiliary quarters includes everything necessary for the ultimate in comfort. There are bathrooms, clothes drying rooms, large pantries, rest rooms, and even a bathhouse. There is a medical station with an isolation area, and a good dining hall. The ventialtion system changes the air twice an hour, while the heating system keeps a comfortable temperature even in the most vicious Siberian cold. Because the units are fully factory ready it takes 5-8 days to set up the complex, which includes preparing the ground, installing lightened foundations, and connecting utility lines. A special plant in Oktyabr'skiy in the Bashkir ASSR has been built to manufacture the modular homes. In the near future it will be producing 200 complexes a year.

The experimental design bureau, in cooperation with the Moscow Architectural Institute, has developed a design of a sports-health complex with a swimming pool and gymnasium for gymnastics, volley ball, pingpong, and weight-lifting. The complex consists of light prefabricated folding sections and the pool is made of synthetic material. The Serpukhov Building Elements Combine of our ministry has begun manufacturing these structures.

The Pyshma Combine has organized production of duplex apartment buildings with full utilities. The buildings consist of two factory-ready three-dimensional units. All that remains to be done at the construction site is to install the units on a simple foundation and connect the utilities. Up to 5,000 such buildings a year will be produced in the near future.

We have developed designs and set up production of modular water heater rooms, diesel power plants, and water supply pumping stations with bactericide installations. All this makes it possible to install utilities quickly, at the same time as the residential buildings are put up.

Finally, model designs of permanent and work communities with all types of utilities and cultural-domestic service for populations between 150 and 1,500 are being drawn up. They will make it possible to provide workers and employees with modern, comfortable housing and all types of social and domestic services in remote regions within a few weeks of the beginning of construction of the community.

Our ministry faces major challenges in the new five-year plan, in particular related to the continued development of the West Siberian fuel-energy complex.

The petroleum deposits being brought into production have worse indicators for reserves and flows and are located far from established industrial centers. The gasfields are moving beyond the Arctic Circle, into permafrost regions. The volumes of all types of construction will increase significantly. New detachments of construction, drilling, operations, and domestic service workers will be arriving in Western Siberia to do this work. With their families this means thousands of people and will require housing construction on an unprecedented scale. In just the first three years of this five-year plan we must build 1 million square meters of housing in inaccessible regions. Many new cities and large and small communities will be built in connection with the continued development of Surgut, Nizhnevartovsk, Nefteyugansk, and Nadym. Large construction organizations from Moscow, Leningrad, the Ukraine, Belorussia, Latvia, Lithuania, Estonia, Sverdlovsk, Chelyabinsk, and Novosibirsk are being enlisted for this work. New construction collectives are being formed and the problems of material-technical supply to them are being solved. The modular unit method will play a decisive part in carrying out this major socioeconomic program set down by the party. All heating, water supply, and plumbing facilities in the new cities and communities will be built in modular form.

The experience we have accumulated leads us to believe that it will be very useful in other sectors as well during construction of small, dispersed projects in different regions of the country. Specifically, it could have a great impact in rural construction in the Nonchernozem region.

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IMPROVED SCHOOLING, RECRUITMENT NEEDED FOR RURAL CONSTRUCTION

Moscow STROITEL'NAYA GAZETA in Russian 12 Nov 80 p 3

[Article by I. Filin, deputy USSR minister of rural construction: "Who Will Be the Replacements?"]

[Text] In the last 10 years the volume of construction and installation work done by organizations of the USSR Ministry of Rural Construction has doubled. Rural construction workers now face important challenges in light of the resolutions of the October 1980 Plenum CPSU Central Committe. Successfully meeting these challenges depends largely on the level of vocational training and the stability of our labor collectives.

The republic ministries developed and have begun implementing a program to improve the labor, living conditions, and vocational training of construction workers in light of the decree of the CPSU Central Committee and USSR Council of Ministers entitled "Steps Toward Further Improvement of the Training of Skilled Workers and Keeping Them in Construction." Worker mobility in rural construction organizations has begun to decline. Whereas it was more than 26 percent in 1975, in the first six months of the current year it was down to 10.1 percent. Moreover, worker mobility is barely half of the sector average in the organizations of the ministries of rural construction of Georgia, Lithuania, Moldavia, and Azerbaijan.

Reducing worker mobility lessens the severe shortage of labor, but it does not solve it. Because of the shortage of students, the state vocational-technical schools send significantly fewer workers to rural construction sites than planned. In 1979 the plan for the basic schools was 63,000 but just 49,000 were admitted. The situation in the Russian Federation is especially alarming. The schools are only 58-60 percent filled The state vocational-technical schools designated to train workers for rural construction organizations of the Nonchernozem region are even lower, just 53 percent.

One of the main reasons for the small number of young people entering construction schools is, in the opinion of some managers of vocational-technical education agencies, the low prestige of the occupation of rural construction worker.

But in that case, we wonder, why are the schools in the republics of Central Asia and the Transcaucasus not experiencing difficulties recruiting students?

First of all, it is because vocational-technical education agencies and base organizations, working in close cooperation, carry on skillful vocational guidance and see that appropriate conditions are created for training the next generation of workers.

In Uzbekistan they do not wait for young men and women to come to the school. On the contrary, the schools themselves go to them. Branches of the schools have been set up in regions where many young people live. Upon graduation from a state vocational-technical school the young people are usually sent to mechanized columns in the regions from which they came or they remain in the organizations where they received on-the-job training. This helps the newcomers adapt to the collective more quickly.

Many construction-vocational technical schools in the Russian Federation have also accumulated instructive know-how. The schools in Permskaya Oblast do a good job. Each year the subdivisions of the Permskaya Oblast Rural Construction Administration receive good replacements from Kungur Vocational-Technical School No 101. The secret of good training for the next generation is simple. From their first days of class at the vocational-technical school the young people feel that they are part of a large collective of construction workers which helps their base schools as sponsors on a daily basis.

When the graduates arrive at a construction site they are welcomed as good friends, as comrades in shared work. Experienced and respected teachers are selected who take a paternal interest in their living arrangements. When the time comes to go into the army they organize departure ceremonies. During the young man's service the collective maintains contact not only with the comrades but also with the unit command. Most young men return from the army to their former collective. For example, 13 men have returned to Yuriy Kravtsov's brigade of Mobile Mechanized Column No 1 30 after service in the army. Many production brigades consist entirely of former graduates of the school. Some of them are already brigade leaders. The prestige of the occupation does not come automatically; it must be developed with attention to the young people's needs.

There are a number of serious problems in the very planning of worker training. Some regions do not even have a single balanced plan for filling vocational-technical schools, tekhnikums, and the ninth grade of general educational schools. Construction schools suffer from this first of all. And the planning system allows the schools to simply report the number admitted. It is not important what jobs the graduates will have, plasterer or cook.

Today, when the demographic situation in the country is quite unfavorable owing to the remote consequences of the war, we must concentrate attention on planning the training of the next generation of workers. The plans should reflect the actual need of various economic sectors for labor.

At the same time, it must be observed that certain executives consider the construction of state vocational-technical schools to be somehow unimportant. Last year the plan for introducing a number of schools in the RSFSR was not fulfilled. Not to mention the resulting lack of students, this also has an impact on the prestige of the occupation. The students are forced to study in ill-suited quarters with all the consequences that follow from that. In our opinion, it would be advisable to organize cooperation between subdivisions of the ministry and interkolkhoz construction organizations to step up the construction of new schools and use them more efficiently. The experience accumulated in Kirghizia confirms this. But in some regions every organization builds its own vocational-technical school without taking labor resources into account. And then they cannot fill them in any way.

The decree of the CPSU Central Committee and USSR Council of Ministers contemplates a further expansion of the system of construction and vocational-technical schools and training combines and development and bolstering of their physical and technical facilities. The state is appropriating a large amount of money for this purpose and the schools must work at maximum efficiency. In addition to improving recruitment for the schools it would be advisable to use their educational facilities to train workers who come directly to production without a specialization and to improve the qualifications of workers, which could include time off from production. This has been tried in Uzbekistan, Azerbaijan, and several oblasts of the RSFSR. The benefit is obvious.

Raising the prestige of the occupation and doing everything necessary to improve the training of specialists and keep young people in the collective is an urgent task which we must accomplish through the joint efforts of construction workers and the employees of vocational-technical education.

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DEPARTMENTAL FOUL-UPS LEAVE TYUMEN' CONSTRUCTION WORKERS WITHOUT CEMENT

Moscow STROITEL'NAYA GAZETA in Russian 16 Nov 80 p 2

[Article by V. Matviyenko, deputy chief of Glavtyumenneftegazstroy: "The Last Boat Left — and Construction Workers of the Tyumen' North Were Left Without Cement"]

[Text] The navigation season in Nadym ended in the second 10 days of October. Hundreds of thousands of tons of cargo were delivered to the construction workers of the northern cities, communities, and gas fields.

As the last steamship departed there was cause for alarm. The delivery of cement to the gas-producing North and Middle Ob' region during the navigation season fell 7.2 thousand tons short. The construction workers of Surgut, Nefteyugansk, Nizhnevartovsk are already standing idle because of the cement shortage. There is a real danger that the builders of the gas fields and compressor plants on the main pipelines will remain without cement until spring.

Only in January, when the swamps in the tundra freeze over, will columns of trucks be able to carry cement north from Tarko-Salenk and Tikhaya. (By then traffic will be traveling on the Surgut — Urengoy highway, which is now under construction.) It is very hard to deliver thousands of tons of cement on winter roads. Day after day the drivers will push on through fierce cold toward Urengoy. It takes fuel and wears down the machinery. A ton of cement delivered in the summer to the Far North by water costs about 50 rubles. Delivered by winter roads it may be 150 rubles or more.

Why did the inexpensive shipping alternative "fall through"? Supplier plants owe the 7,200 tons of cement to Glavtyumennestegazstroy [Main Administration for Petroleum and Gas Construction in the Tyumen' Region]. The main administration waged a battle for cement from the first days of the shipping season. The first telegrams were sent to Soyuzglavtsement [Main Administration for Interrepublic Deliveries of Cement] in the spring. They were addressed to the supplier plants, asking for an increase in shipment. But the situation did not change for the better. The main administration in Tyumen' warned of the consequences of the failure to deliver the cement during the shipping season. The volume of construction and installation work in these quickly developing regions was expected to increase 50 percent in the coming year, but existing supplies of cement were exhausted. They put all their hopes on the navigation season.

So deliveries broke down even though a number of authoritative decisions were adopted in recent months to compel unconditional fulfillment of cement supply assignments to the Tyumen' region in view of the special importance of these construction sites to the national economy. Perhaps it is now too late to review the crisis with cement, if nothing can be done today to correct the situation? On the contrary, we must learn lessons from what happened and clarify why everything turned out as it did, what was the root of the trouble? It is already time to take steps to see that the trouble does not recur in the 1981 navigation season.

What do they say about this situation at the supplier plants, at Soyuzglavtsement, and at USSR Gossnab?

Why do the plants fail to carry out the instructions of Soyuzglavtsement itself on priority shipping of output to the regions of the Tyumen' North according to allocations for Glavtyumenneftegazstroy? In the local areas they blame everything on objective difficulties: the shortage of railroad cars and containers, and a ban on shipping.

In fact, the Southern Ural Railroad refused to deliver railroad cars to the Magnitogorsk cement workers. On one occasion cement was not shipped from Krasnoyarsk. The railroad workers made the excuse of "countershipments." Only after dozens of telegrams, phone calls, and appeals did the Ministry of Railroads, as an "exception," authorize the dispatching of railroad cars from there for Surgut. The Surgut workers received 3,000 tons of cement less than planned. Part of it was destined for the Ukrainian construction workers who are beginning to erect housing at Khanto station. The Magnitogorsk Cement Plant is 2,800 tons short of its shipping plan since the start of the year and the Karaganda Cement Plant has stopped its deliveries to the Nadym region.

Cement traveling north is transferred from the railroad to river ships. Glavtyumenneftegazstroy requested 43,700 tons as the ceiling on mixed shipping, but the Ministry of Railroads and the RSFSR Ministry of River Fleet together agreed on only 22,100 tons. This is just half the trouble, for they did not even meet this limit. The river workers showed outward signs of concern, understanding the importance of delivering cement to the North before the end of the shipping season. But their actions were not so helpful. For example, the Tobol'sk and Omsk river ports refused to receive cement from Bryansk, Karaganda, and Magnitogorsk despite the fact that the receiving parties had authorizations. Their excuse was that they would not be able to deliver the cargo to Nadym before the end of the navigation season. The main administration in Tyumen' was forced to receive cement at its shore bases, which are not equipped for processing and storing such large shipments.

It is not hard to guess why the river workers are acting this way. They are looking out for their own advantage. Transshipment of cement is very labor-intensive and promises a large overexpenditure of the wages fund.

When railroad cars carrying cement pile up at the river ports the Ministry of Railroads declares a ban on cement shipment to these ports. This ban does not bother the river workers at all. Only the receiving party suffers here. When the receiving party is able to get the ban lifted, it takes a while for the cement deliveries to start up again. Here is a curious fact.

N. Konarev, deputy minister of railroads, sends the telegram about the regular shipping ban directly to the chiefs of the shipping station. But the dispatch lifting the ban usually goes over to the administration of the railroad. It takes some time for the order to reach the shipping stations. It is hard to know if there is a ban or not. This system of handling papers may be convenient to the Ministry of Railroads, but it is plainly harmful to the work.

The failure of cement delivery to the North during the past navigation season occurred primarily because departmental advantages were placed above national economic interests. This means that the interests must be combined so that it is profitable to everyone to ship cement, to the river workers and the railroad workers. How can this be done? Probably, we should begin by stopping the shipment of cement in paper bags. The container or pallet method of shipping might be suitable here.

Finally, the construction workers of the Far North should be given allocations for cement and other building materials so that they have a 300-day supply untouched at the end of the navigation season. This reasonable system was used before. It is too bad that it has been disregarded in recent years.

One more thing. In the first and second quarters of 1981 USSR Gossnab should plan allocations and ceilings on cement shipment to the Tyumen' North so that a large supply is ready at the ports by spring and all the cement can be shipped north successfully in the short navigation season. The bitter lesson of the 1980 season must not be repeated.

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CONSTRUCTION

METHOD OF CALCULATING PRODUCTION CAPACITIES OUTLINED

Moscow VESTNIK STATISTIKI in Russian No 12, 1980 pp 18-22

[Article by V. Dulich and A. Skvortsova: "Some Issues of Statistical Study of Reserves for Growth in the Volume of Contract Work"]

[Text] The CPSU Central Committee and USSR Council of Ministers decree of 12 June 1979 entitled "Improving Planning and Strengthening the Influence of the Economic Mechanism on Raising Production Efficiency and Work Quality" urged the ministries and departments of the USSR and the Councils of Ministers of the Union republics, beginning with the 11th Five-Year Plan, to ratify plans of capital construction balanced against the capacities of construction-installation organizations.

The problem of balancing the volume of construction-installation work with available production capacities of contracting organizations is especially timely today when the country is doing a great deal of extremely important work to formulate the State Plan of Economic and Social Development of the USSR for the coming five-year plan and for the longer run (until 1990).

In this connection, one of the jobs of the statistics of capital construction is statistical study of reserves for growth in the volume of contract work based on maximum use of the production capacities of construction and installation organizations.

The economic literature has frequently given recommendations on calculating this indicator, but often they contradict one another. For example, in some the main criterion in determining the production capacity of a construction-installation organization is considered to be labor resources, while in others it is the value of fixed productive capital, its active part, or the stock of construction machinery in physical terms. There have also been proposals to compute production capacity in cost terms for the organization as a whole and in physical terms by particular types of work. Some authors recommend that the maximum volume of work the organization is capable of doing be taken as the production capacity of a construction-installation organization, while others propose the volume of work actually done by the organization.

The difficulty of determining the production capacity of a construction-installation organization is a result of sectorial characteristics of construction production. We should also note that USSR Gosstroy, with USSR Gosplan, the USSR Central Statistical Administration, USSR Gosbank, and the construction ministries have worked out a "passport" (registration certificate) for a construction and installation organization. This document will be introduced at the beginning of the 11th Five-Year Plan. The existence and use of production capacities are the primary indicators in the passport. The indicator of capacity is new both for the economic services of construction-installation organizations and for employees of capital construction statistics. It is not entirely based on data from statistical reporting forms and cannot be monitored by state statistical agencies because of the lack of a special reporting form. Development of such a form is being held up by the lack of a uniform methodology for calculating production capacities.

Under these conditions, statistical agencies can to some extent use the experience of industrial statistics when totaling the work results of leading construction associations and trusts in the oblast, kray, and republic and when identifying reserves for increasing the volume of work done by them through better use of capacities. The basic principles of calculating the production capacities of existing industrial enterprises, as ratified by USSR Gosplan and the USSR Central Statistical Administration, envision basing the calculation on the amount of production equipment assigned to the primary shops of the industrial enterprise, its technical (normative) productivity, and the calculated annual working time of the equipment.

Machines and mechanisms are increasingly becoming the determining factor in growth of the volume of contract work in construction. Fixed production capital for construction work was worth roughly 50 billion rubles for the national economy as a whole at the start of 1980, including 28 billion rubles at state contracting construction-installation organizations. In the first four years of the 10th Five-Year Plan these figures rose 35 and 30 percent respectively. Fixed productive capital for construction purposes rose roughly 10 percent a year on the average during this time.

The cost of machines, equipment, tools, and production accessories, which means the active part of fixed production capital, is growing each year for contracting organizations as a whole and for the particular construction ministries. This leads to an increase in the indicator of the machine-labor ratio. In the first four years of the 10th Five-Year Plan this ratio increased 25 percent.

As specialization develops in construction and the organizational structure of management is refined construction machines and mechanisms are increasingly concentrated at specialized construction organizations, the mechanization trust and administration. The construction and installation administrations have only labor resources and small power equipment. In recent years specialized sections for small power equipment have been set up within the mechanization trusts and administrations.

Considering the distinctive features of the organizational structure of management in construction, it is recommended that production capacity be determined at the level of the trust or construction-installation production associations. These are the chief cost accounting (khozraschet) elements of construction production established within the construction ministries in the transition to the two- and three-level systems of management. In our opinion, the available production capacity of a construction-installation association can be computed both for particular types of construction and installation work and for the association as a whole. For particular types of work it can be calculated based on the average annual quantity of working construction machines and mechanisms, the estimated annual resource of work time for them, and the technical productivity of these machines and mechanisms.

The calculation of available production capacity also includes all working construction machines and mechanisms designated for use during the report period. The calculation considers equipment brought in from outside as well as equipment that is down as the result of malfunctions, repair, and modernization, plus equipment that is being installed or stored in a warehouse. Where an organization has several types of working construction machines that perform the same construction and installation jobs, the production capacity is calculated by the total capacities of these machines.

The calculated annual resource of working time of the working construction machines and mechanisms is determined on the basis of the established work regime of the construction-installation organization with due regard for the optimal number of work shifts by the machines and mechanisms and local natural conditions. Machine downtime caused by shortage of labor, construction components and materials, means of transportation, lack of a work front, and other factors should not be excluded from this time.

The technical productivity of construction machines and mechanism means maximum productivity for an hour of continuous work under the concrete operating conditions. Technical productivity is determined on the basis of technical output norms or design indicators of the productivity of construction means and mechanisms using progressive technology and sophisticated labor organization.

The list of working construction machines and mechanisms by which production capacity, calculated annual resource of working time, and technical productivity should be calculated is ratified by the higher-ranking organization.

We will now give an example of calculating the available production capacity for a report year for earthwork (the working machines are single-scoop excavators, bulldozers, and tractors with mounted implements).

During the report year the association had 51 single-scoop excavators, 85 bulldozers, and 28 tractors with mounted implements (computed for the year on the average). The normative annual working time of the single-scoop excavator and bulldozer is 23,000 hours, while for a tractor with mounted implements it is 1,800 hours. The technical hourly productivity of the excavator is 44.8 cubic meters, while for the bulldozer it is 24.4 and for the tractor with a mounted implement it is 20.8 cubic meters.

The annual production capacity of the association for earthwork will be

$C_e = (51 \times 2{,}300 \times 44.8) + (85 \times 2{,}300 \times 24.4) + (28 \times 1{,}800 \times 20.8) = 1{,}073{,}000$ cubic meters or 7,775,000 rubles.

The annual available production capacity of the association for installation of concrete and reinforced concrete construction components is determined in a similar manner to be 2,184,000 rubles, while the capacity for loading and unloading work is 1,159,000 rubles.

A significant proportion of work done in construction is done with small power equipment, tools, accessories, and attachments assembled in standard sets. Manual work is also substantial. This proportion is especially high in finishing jobs. If it is not possible to single the working machine out from the standard kit, we believe that production capacity can be calculated by the average annual number of standard kits (sets of small power equipment, tools, accessories, and the like) that the organization has for the particular type of work and its maximum annual productivity. This productivity is determined on the basis of the calculated annual resource of working time for the standard kit, the normative number of properly qualified workers using the kit, and the progressive output of a single worker.

Here is an example of calculating the annual available production capacity for plastering work done with standard kits.

During the report year the association had 15 standard plastering kits (average annual computation), with 16 appropriately qualified workers in the standard brigade. The calculated (normative) annual resource of working time of a standard kit is 1,390 hours and the progressive hourly output of a single worker is 2.2 square meters.

The annual available production capacity for plastering work will be:

$$C_{pl} = 15 \times 1{,}390 \times 16 \times 2.2 = 733{,}500 \text{ square meters or } 5{,}332{,}000 \text{ rubles.}$$

The annual capacity of the association for concrete and reinforced concrete work (2,994,000 rubles), painting (12,522,000 rubles), roofing (1.4 million rubles), masonry (996,000 rubles), and carpentry (745,000 rubles) done using standard kits is determined in a similar manner.

For types of construction and installation work done mainly by hand the production capacity is calculated on the basis of figures on the actual average number of workers listed in these types of work, the maximum resource of working time for them, and a progressive output figure. The progressive output of workers is calculated on the basis of normative output for types of jobs taking into account organizational-technical steps to raise the level of mechanization, maximum use of the time of workers and construction machinery, raising the level of prefabricated work, improving the organization of production and labor, and other factors.

Here is an example of calculating the annual available production capacity for carpentry work done manually.

The average number of workers listed for carpentry jobs is 392. The progressive annual output of one worker is 2,300 square meters.

The annual available production capacity of the association for manual carpentry work will be:

$$C_{car} = 392\times2.3 = 901{,}600 \text{ square meters or } 9{,}052{,}000 \text{ rubles.}$$

Production capacity for manual roofing, calculated in the same way, was 1,025,000 rubles.

Production capacity for types of work is calculated both in physical and cost terms. For the trust or association as a whole it is determined on the basis of the estimated cost as the sum of capacities for all types of work.

In our example the annual production capacity for the association as a whole based on estimated value was:

$$C = 7{,}775{,}000 \text{ rubles} + 2{,}184{,}000 \text{ rubles} + 1{,}159{,}000 \text{ rubles} + 5{,}332{,}000 \text{ rubles} + 2{,}994{,}000 \text{ rubles} + 12{,}522{,}000 \text{ rubles} + 1{,}400{,}000 \text{ rubles} + 996{,}000 \text{ rubles} + 745{,}000 \text{ rubles} + 9{,}052{,}000 \text{ rubles} + 1{,}025{,}000 \text{ rubles} = 45{,}184{,}000 \text{ rubles.}$$

The production capacity of construction-installation organizations is not a constant quantity. It may change with the receipt of new or withdrawal of old construction machines and mechanisms, the structure of jobs, and other factors. Therefore, the production capacity is calculated each year.

It is advisable to determine the use coefficient of production capacity by dividing the volume of contracting work actually done in the year by the production capacity in order to identify reserves for growth in the volume of contracting work of the trust or association. It should be kept in mind that this coefficient cannot be greater than one.

In our example, the use coefficient of production capacity, with the volume of construction and installation work actually done during the report year for the association as a whole having an estimated cost of 32,080,000 rubles, will be:

$$K_{use} = 32{,}080{,}000/45{,}184{,}000 = 0.71.$$

The use of a construction organization's production capacity is significantly affected by the availability of building materials, construction components, and parts. This depends greatly on establishing and using their own production base. Thus, 52 percent of the total value of building materials used by organizations of the Ministry of Construction of Heavy Industry Enterprises to perform contract work with their own personnel were manufactured themselves, while for the USSR Ministry of Construction the figure was 43 percent, for the USSR Ministry of Rural Construction — 42 percent, and for the USSR Ministry of Industrial Construction — 41 percent.

Report figures show that the capacities of the construction ministries' own production facilities are increasing slowly. Capital investment allocated for this purpose is not always fully incorporated and capacities for the production of precast reinforced concrete design components and parts, wall materials, glued wooden components, and other important materials are not being fully introduced. In the first four years of the 10th Five-Year Plan, for example, the USSR Ministry of Construction of Heavy Industry Enterprises fulfilled its plan for introduction of new capacities to produce precast reinforced concrete components and parts by 89 percent, while for the USSR Ministry of Rural Construction it was 85 percent and for the USSR Ministry of Construction — 87 percent.

Statistical study of the availability and use of production capacities at construction organizations and of the enterprises which are their production base will enable workers in capital construction statistics to identify additional reserves for increasing the volume of contract work for the territory of an oblast, kray, or republic.

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METALWORKING EQUIPMENT

PROGRESS IN ROBOT TECHNOLOGY

Use of Robots in Uzbek Industry

Tashkent PRAVDA VOSTOKA in Russian 5 Oct 80 p 3

[Article by I. Rogov]

[Text] Much has been written about industrial robots in recent years. The fact that we are finding out that they service milling machines at the "Kommunar" automobile factory in Zaporozh'ye, and that we are hearing that a "mechanical helper" plants cabbage at the Leningrad "Ruch'i" sovkhoz, are examples. And this is not simply a technical fad, but the dawn of a new age, an urgent need, brought about primarily by the worsening problem of labor resources.

The resolutions of the CPSU Central Committee call for an extensive program of the production and application of automatic manipulators in the national economy. It is pointed out, in particular, that the comprehensive mechanization and automation of industry based on the application of manipulators is an important trend in the elevation of labor productivity and acceleration of scientific-technical progress.

In the industry of our republic robots are taking, so to speak, just the first steps, and the efforts of individual collectives, aimed at "robotization" of industry, are especially important here. Noteworthy, for example, is work being done in this field by the collective of the "Tekhnolog" scientific-industrial association.

Experiments began several years ago, and the first result was a manipulator intended for mechanization of stamping operations on one-piece blanks. It is important to note that stamping was chosen not by accident. This is one of the most monotonous industrial operations, and today there are fewer and fewer who want to do such menial work. At the same time it is comparatively easier to build a robot for stamping, in view of its repetitiveness.

The manipulator itself is a "mechanical hand," which moves in a horizontal plane and feeds blanks to a press. It is working at the "Chirchiksel'mash" plant, where a second manipulator is already being installed and, as they say, it will increase labor productivity by 20%.

But these percentage points are not the only important point. Of course, the first robot was not perfect. For example, a worker still has to attend the press, and she herself must feed blanks to the manipulator. The objective was to try a new design and to check how it actually performs under industrial conditions. The manipulator has been working virtually flawlessly at the factory for 2 years now. And how do the workers feel about it?

"First they viewed it as an attraction," says automation laboratory chief Yuriy Ivanovich Khoshev. "And then they got used to it and ignored it. It just keeps on working and working..."

To release the press worker it was also necessary to mechanize the feeding of blanks to the manipulator. The simplest way was to build a storage bin, from which the mechanical hand could take them one at a time. It was used, and now an experimental manipulator with a storage bin, which will be installed this year at the Tashkent tractor factory, is being built. Next year four more of these manipulators are supposed to be placed in operation there.

It should be pointed out that "Tekhnolog" specialists are doing all the work on the robots today in cooperation with the collective of the tractor factory. And the fact that the supervisors of the enterprise exhibited great interest in and paid attention to the promises of this business also played an important role. In particular, the factory set up an experimental shop, where "mechanical helpers" will be put to work, and where workers will be trained to operate them before they are installed in the shops.

Purely industrial robots became the next step in this direction. The distinction is rather conditional, but robots, in general, have greater freedom of movement than manipulators and they have more flexible programs. The first to be adopted are two "Tsiklon" type robots, which are already being used in the national industry.

Each of them consists of two pairs of mechanical arms, which while extending and retracting can turn around their axes to any given distance and at any angle to each other. For example, they can pick up blanks weighing up to 5 kilograms, place them in a press and, after stamping, remove the finished parts. One of these robots is supposed to be installed at the factory at the end of this year, and the other at the beginning of next year. The approximate saving provided by each robot will be 4,000-5,000 rubles annually.

It is also important to mention here the "Universal-5" robot, which is also used in industry. It is intended for mechanizing the charging of metal-milling machinery with one-piece blanks and will also take its place at the factory next year.

And, finally, "Tekhnolog" and the factory along with the Moscow Scientific Research Institute of Tractor and Farm Machinery Engineering, are doing a great job. This job consists in the fact that six more "R-505" industrial robots will be installed in the factory for making tractor parts. The institute is already building the robots, "Tekhnolog" is supplying the auxiliary hardware and equipment, and the factory is getting ready to use the new mechanical assistants.

And so, the tractor factory will eventually have a solid inventory of industrial robots. How, in any case, will they contribute to production? Yuriy Ivanovich

Khoshev answers this question by listing the following points: "First, they will replace workers, which given the nagging shortage of labor, is extremely important. Second, they will free workers from backbreaking and monotonous labor. Third, they will smooth out the output of products: unlike people, robots do not get tired and are not distracted. Furthermore, they will improve the quality of products -- a good robot does not make mistakes. They can work equally successfully on evening and night shifts. They are not afraid of getting hurt and they fear no occupational illness..."

This list, of course, can go on and on. Robots are deserving of all this praise. But let us say briefly that they improve industrial efficiency, and it is worthwhile to strive for that objective.

Robot Developments at Leningrad Institute

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Oct 80 p 2

[Article by Ye. Yurevich, Doctor of Engineering Sciences, Professor, Chief of Special Design Bureau of Polytechnical Institute: "Robot Engineering Strategy"]

[Text] The effort to relieve man of heavy and monotonous manual operations, to make his labor more creative and meaningful was and continues to be at the center of attention of our Party and government. Confirmation of this is the fact that the CPSU Central Committee recently adopted the resolution "On measures to increase production and to adopt extensively automatic manipulators in sectors of the national economy in the light of the directives of the 25th Party Congress." It emphasizes that automatic manipulators (industrial robots) are one of the most effective means of achieving comprehensive mechanization and automation of production and sets forth an extensive program of measures to assure the accelerated development of robot technology. The special design bureau of industrial cybernetics of the Leningrad Polytechnical Institute has played a leading role in recent years in the development of this new scientific-technical trend. Today the supervisor of that collective shares his thoughts on ways to develop robot technology.

Delivery to Technology

Looking like the "arms" of modern robots, they remove red-hot blanks from the stamping press, tirelessly feed parts to a machine or assemble the most sophisticated mechanisms. Their social importance is easy to evaluate: they relieve human beings of laborious and monotonous manual operations and make their labor more creative and attractive. However, it would be wrong to see in a robot simply some equivalent worker, standing at a machine or assembly line.

The desirability of replacing people with robots under conditions of dangerous and heavy industry raises no doubt, even on a one-to-one basis. In other cases, when the objective is to substantially improve labor productivity, such a replacement may not provide the desired effects if it does not entail radical changes in technology.

The situation is entirely different when one robot can service several machines or presses, converting them to an entirely automated complex of equipment or, for example, the same individual machines, comprising a technological change, are converted to something like an automatic assembly line with the aid of a "brigade" of workers. In such complexes, according to experience, one industrial robot releases an average of 2-3 workers, which means a 2-3-fold increase of labor productivity, and substantially improves the machinery utilization efficiency.

The essence consists not only in these indices: these technological complexes can be viewed as a first step toward the development of entirely automated shops and whole enterprises with high flexibility for converting to the production of new products. The main objective of robot technology is specifically the development of these industries.

Thus, the delivery "to technology," for the development of qualitatively more efficient technological complexes, is perfectly justified, both from the standpoint of current needs, and of the more distant future. And this can be the cornerstone of our strategy in the field of robot engineering. It is not only the fundamental question of the objective of scientific-design developments, but of the entire organization of business as well.

Requirements and Resources

Judging by orders of several machine-building ministries, approximately 120,000 robots and manipulators, which will release about 350,000 workers and provide an annual saving of about 1 billion rubles, will be ready for use by the end of the next decade. However, these data do not reflect actual requirements, if only because they are based on current experience in the utilization of robots and their present characteristics. These data also ignore in equal measure, for example, the fact that nearly 50% of the milling machine inventory is outside of the sphere of machine-building. But mainly, these data do not reflect the requirements of many industries, where robots can be used with just as much success: metallurgy, mining, light industry, the food industry, agriculture, construction, transportation, medicine and services.

If we go "from technology," based on analysis of the entire inventory of technological equipment and of operations that can be turned over to robots in the future, then the figures are more impressive. According to the most modest calculations, if business is properly organized in the next decades we can talk about the replacement of more than 1 million workers and an annual saving of the order of 3 billion rubles. But this will require an inventory of robots and manipulators of up 350,000-400,000.

I am afraid that today, when the total number of robots in our country barely approaches 6,000, that the figures given above seem a little less than fantastic. Nevertheless, they are a good indication of the future insofar as the production of robots and manipulators must be speeded up.

The problem on this scale might seem beyond the grasp of any 2-3 sectors which already are burdened with countless responsibilities. It can hardly be figured that this problem can be solved quickly by developing a special industry. On the other hand, the problem appears solvable if all sectors with mechanical engineering capabilities take part in the development, production and adoption of robots and robotized technological complexes. It is obviously best to take into consideration the features of the technology used in the planning of complexes and or robots in them within the framework of a specific sector. The experience that has been accumulated in robot technology is an argument in favor of decentralization. As we know, the first studies in the development of this field in our country were undertaken about 10 years ago in higher education and in leading technological organizations of a number of industries. But by 1974 a resolution was adopted regarding the organization of series production of automatic manipulators. Minstankoprom [Ministry of Machine Tool-Building Industry] was named in it as the leading ministry on problems of the development and production of robots, and Minpribor [Ministry of Instrument-Making] was placed in charge of control systems. The corresponding tasks on robot production were also assigned to other ministries.

Our special Design Bureau of Industrial Cybernetics (OKB TK) of the Leningrad Polytechnical Institute, in anticipation of possible delays in decentralization, was named the leading organization, responsible for the development of industrial robots, their scientific-technical level and coordination of efforts. And since the middle of the Ninth Five-Year Plan the unity and direction of technical policy in the field of robot technology were already defined by the corresponding program of projects of the USSR State Committee for Sciences and Technology, in which the USSR Academy of Sciences and higher education participate, in addition to main machine-building ministries.

By way or summarizing the results of this phase, it can be said that measures that have been implemented turned out to be effective enough. About 100 models of robots and manipulators have been developed in the last few years for automating processes connected with machining, stamping galvanization, casting, welding and assembly. More than 40 models are in series production. And the total production of robots has doubled the initial goals.

At the same time we have encountered a number of unpleasant facts. For example, Mintyazhmash [Ministry of Heavy Machinery Manufacture] and Minkhimmash [Ministry of Chemical Machinery Manufacture] actually eliminated themselves from the production of robots. Minavtoprom [Ministry of the Automobile Industry] could not complete its assignments, particularly on welding operations. Minelektrotekhprom [Ministry of Electrical Engineering Industry] terminated the development and organization of the production of electrical instruments for automatic manipulators. So far we can only hope that Minstankoprom will manufacture hydraulic and pneumatic machinery on a high technical level.

Recent years have dramatically proven the feasibility of organizing production of adopting robots, even within the scope of individual economic rayons. Based on the support of Party agencies, this problem was solved on the principles of the extensive cooperation and coordination of the efforts of local enterprises. As a result, for example, in Leningrad and Leningradskaya Oblast the pool of industrial robots has been expanded 4-fold in the last 2.5 years and now accounts for more than 10 percent of the total number of robots in the country. It is clearly necessary, during planning of the future of the development of robot technology, to view this regional form of organization as an important resource.

On the Modular Principle

It is no secret: the course toward such decentralization of operations raises considerable risks for certain specialists. This is primarily because it can lead to the appearance of hundreds of models of narrowly specialized robots, the production and operation of which will be vastly more complicated and expensive.

The search for the most effective ways to solve the problem in the final analysis led to the following idea: the development of robot technology must be based on the principle of modular design. The essence of this principle consists in the development and organization of the series production of individual parts of a robot construction. Each of them is manufactured as a typical series of unified modules. Robots of given complexity for specific operations are then assembled from these modular elements. Preliminary calculations indicate the production of robots on the modular principle can be doubled in the next five-year plan in comparison with the planned production at the same cost.

Studies conducted by our OKB TK, together with other participants, disclosed that industrial robots and manipulators for virtually all basic spheres of application can be assembled on the basis of 10 pneumatic, 15 electromechanical and 20 hydraulic modules. In this case the design and production strictly of robots will be reduced chiefly to their assembly out of standard units and therefore can be organized within the framework of any sector.

The advantages of the modular design principle are obvious. It sharply reduces, from 2-3 years to several months, the time necessary for the development, production and adoption of new robot models. At the same time it increases the technical level and dependability of manipulators, reduces their adoption and operating costs and simplifies servicing. It will also be much easier to solve problems of the modernization of automated technological complexes -- they will be reduced to a considerable extent to the refitting of the robots included in them with new modules. Nor is there any doubt of the economic aspect of the problem. The cost of modular robots promises to be much lower. Calculations indicate that the conversion to this principle for the production of 120,000 robots will save about 150 million rubles.

Of course, the production of unified modules in the necessary numbers will require additional capacities. But capital investments here will be an order of magnitude lower -- indeed we are talking about the organization of long series production with a stable product output. In contrast to the robots themselves, these industries should already be concentrated within the framework of 3-4 sectors with the corresponding experience.

The modular principle should also be used for the development of control systems for industrial robots. Modern industrial robots of the first generation, like machine-like with ChPU, are controlled by rigid programs. But although they will also be used in the future, by 1985, judging by forecasts, second-generation robots, equipped with technical "sight," tactile sensors and other "sensory" organs, will play the leading role in the sphere of production. And by the end of the next decade third-generation robots will take over. They will be able to actively interact with the environment and independently solve problems of the perfection of their performance, depending on the tasks assigned to them.

Hence it is obvious that the basic trend in the further improvement of robots is related primarily to the development of control systems -- of their architecture and program algorithms. Meanwhile the control systems account for about one-half of the cost of robots today. But in the future control will determine both the cost and the basic characteristics of robots.

From these points of view our OKB TK has developed a unified system of control modules, which includes a collection of future-generation sensory instruments necessary for future-generation robots. From modules of this system it will be possible to assemble control systems of any complexity -- from the simplest to those capable of controlling a whole group of machines. Furthermore, they will offer the capability of adaptive control or computer control and will combine assembly lines, sections and shops, built on the basis of robots, by means of automated technological process control systems (ASUTP).

The trend toward the modular principle does not rule out the fact that in some cases, for example in specialized technological complexes, manipulators and control systems of the nonmodular type may be more suitable. Nor does it mean that we should scrap time-tested modules that have already been placed in production. On the contrary, their production should be expanded by all available means. Another difficulty of the forthcoming phase will, perhaps, be the task of integrating the expanding production of robots with conversion to modular constructions.

Division of Responsibilities

The modular principle will make it possible to carry out a unified technical policy, despite decentralization of the planning, production and adoption of robots. However, it will not erase from the agenda the question of specialization, division of responsibilities and spheres of responsibility. This applies especially to the central problem of robot engineering, the essence of which consists in the development, on the basis of unified robots and manipulators, of typical technological complexes, capable of handling all basic kinds of industrial processes. And typical solutions promise to reduce the cost of comprehensive automation by a factor of 3-4 and to substantially accelerate its implementation.

Who should build these complexes? When the discussion pertains to technology used within the framework of a single sector the answer is obvious: either the sector itself, or the ministry that provides it with technological equipment. But many industrial processes, such as milling, welding, painting, heat treatment and others, are performed in numerous sectors. And in this case a different approach should be taken. Perhaps the leading ministries responsible for the development, production, assembled delivery, setup and subsequent servicing of robotized technological complexes should make this determination for each such general industrial processes.

As a logical extension of the course "to technology," several completely automated test shops should be set up on the basis of robotized technological complexes and ASUTP. As a prototype of future industries, they are needed as a neat kind of test range for working out basic technical-economic and organizational solutions.

Suggestions about the development in the various sectors of special NII [Scientific research institute] and KB [Design bureau] on robot engineering complexes, proposed from time to time, appear to be doubtful in this connection. The development both of robotized complexes and of the robots in them must not be detached from technology. Therefore the teams of developers of this technology must also cooperate with the leading technological organizations responsible for the mechanization and automation of the corresponding processes. Then they will be able to completely solve problems and to make efficient utilization of the entire arsenal of the tools of automation.

Attempts to undertake the development of robot technology entirely in accordance with the construction of new enterprises also seem inconsistent. This approach is erroneous in and of its essence, not to mention the fact that it could delay the solution of problems. Industrial capacities must be expanded, especially for the production of unified modules. As for the production of robots, it is more realistic here to strive for the coordination of existing enterprises, possibly with the reconstruction of their shops and with the termination of the production of similar, but obsolete products.

It should be taken into account here that given their technological novelty, industrial robots as products do not require the application of any special industrial processes or technologies.

Looking Ahead

It is perfectly obvious that even with a powerful industrial base, robot technology cannot develop successfully without serious scientific attention. Furthermore, the level of fundamental studies, as in the field of the development of new-generation robots, is today one of the most important indices of the scientific-technical potential of the nation. The responsibility of scientists of the USSR Academy of Sciences and of higher education will increase immeasurably in this connection.

The question of the role of higher education, as I see it, requires a special examination. As is known, our VUZ's were among the initiators of the development of the first robots and manipulators and actively promoted the development of robot technology as a promising scientific-technical field. Even today they account for about one-third of the volume of work under the scientific and technical program of the USSR State Committee for Science and Technology. And in the future, in consideration of the scope and general industrial nature of problems, higher education should become an important link in the development of robot technology.

The industrial independence of the VUZ's, which assures an objective and far-ranging approach to the solution of problems that arise, is an argument in favor of the suggestion. At the same time the VUZ's have scientists in the most diversified specialties, which enables them to carry out complex and comprehensive research and development.

The problems of robot technology listed above, should, it seems to me, find reflection primarily in the comprehensive program of scientific-research and planning-design projects developed in accordance with the resolution of the CPSU Central Committee. However, the scope of the task with which we are faced is such as to lead us to the following conclusion: there is an equal need for a future program in the sphere of the production and adoption of robots. And for the supervision of the entire course of efforts it would be desirable to develop an interdepartmental coordination council on robot technology.

Orel 'Prompribor' Robots Production

Moscow EKONOMICHESKAYA GAZETA in Russian No 37, Sep 80 p 16

[Article by N. Sergun'kin: "The Family of Robots Grows"]

[Text] The trademark of the Orel "Prompribor" association does not stand out in day to day life and obviously is not very well known. Meanwhile not a single household refrigerator in our country is manufactured without a thermostat, manufactured by that enterprise. Various instruments for monitoring and automatically regulating temperature are used extensively in ventilation and air conditioning systems. They are used, for example, in the subway and at hydroelectric power plants and work well in mine shafts, produce warehouses and on refrigerator ships.

The production volume of these devices will increase by 60% in the current five-year plan. Engaged in competition for the honorable meeting of the 26th Party Congress, the collective of "Prompribor" pledged to fulfill the five-year plan by the 63rd anniversary of the Great October. This considerable expansion was based on reconstruction and technical reoutfitting of production.

Many innovations of technological progress can be seen in the shops of the factory. In addition to milling machines with numerical programmed control and processing centers, there have appeared here original automated milling machines, equipped with manipulators.

In the old technology a thermostat case passed through the hands of a dozen stamping machine operators. Each operation required stressful attention, diligence and precise motions. Today this work is being done by multiposition automated presses, manufactured by the Barnaul forge-press machinery factory. Each of them performs more than 20 operations. Ten times during the course of the process a manipulator moves a part from one position to another. A multiposition automat is attended by one setup operator, who replaces 10 workers.

Highly efficient industrial robots are being built at numerous enterprises. However, as was pointed out recently in the resolution of the CPSU Central Committee on automatic manipulators, the organization of developments, production and the volume of production still do not meet the needs of the national economy.

The Barnaul manipulators are good ones, but they are not universally applicable. The press-stamping shop of the Orel Prompribor association mass-produces more than 30 brands of parts. And they are needed in different quantities, depending on the different models of thermostats. Often it is necessary to retool and refit the machines. Losses of work time are unavoidable. But can they not be reduced to a minimum?

At "Promribor" they decided not to wait for new developments, but to improvise. They analyzed the experience of similar enterprises in Moscow, Leningrad, Minsk and other cities and selected the most beneficial experience. The automation and mechanization shop became involved in the manufacture of general purpose manipulators. It became a laboratory of technical progress for the factory.

Automated presses, assembly machines, automated assembly lines, equipped with manipulators, can be seen there in different stages of readiness. The entire collective of designers and workers is engaged in technical creativity. Fitters Yu. Vysotskiy, A. Chernyye and many others have been named high-class masters.

The Orel robots are considerably smaller than the Barnaul models. With precision movement a mechanical arm removes a blank from a cartridge. It has no "fingers" -- suction cups perform that function very well. A part is placed in the stamp faster than the eye can follow. In an instant the operation is complete. It only takes 2 seconds to do it. Thirty parts are stamped every minute.

After the complete adoption of the automatons the press-stamping shop will save 14,000 quota hours a year. Designers V. Yevstaf'yev and N. Mitrofanov exhibit considerable ingenuity. Designers Ye. Startsev, G. Gorshkov and others, who have developed automated assembly lines with manipulators, are just as good. Several of these complexes already are in operation in the shop. The line consists of three presses, which from sheet metal make a finished part -- the thermostat control lever.

A worker on an ordinary press can do just one operation. Now one setup operator can look after four lines all at once. But the effect is not limited simply to an increase of labor productivity. The character of work is changing. The new technology eliminates man from monotonous operations and it makes work more interesting.

The following story was told in the shop. A woman wanted to retire. Her pay was good and she got along well with the collective, but the monotonous work became wearisome. The plant did not want to release her because her experience was a valuable asset. And then it was suggested that she switch to a new automaton with a manipulator. They just happened to be setting up the next machine at that time. The woman was interested and along with other workers and specialists began to prepare for operation, and she stayed. This was perhaps a special case, but there are many others. Professional prestige increased and the labor turnover rate decreased.

It is important to emphasize that in the first half of this year alone the number of workers in the shop was reduced by nearly 10%. Some retired and others were transferred to other shops. Their labor was saved by the automatic machines. And the industrial program is growing and is being completed successfully. And resources are by no means exhausted.

The plant designers are faced with the task of automating the filling of cartridges with parts. This operation is still being done manually. The problem will become even more urgent and will require even better solutions after the inventory of new machines is expanded.

Both successes and blunders can be found in the pressing and stamping shop. They gladly accept experience and openly talk about problems. In particular, there is an urgent need to organize the training of setup operators in the servicing of industrial robots. There are still no specialists in the professional and technical training system.

Says chief D. Lenskiy: "We envision our shop as completety automated. We will reach this objective in the 11th Five-Year Plan." Incidentally, the efficiency of the new technology is completely manifested only in multimachine servicing. And this means that a lot of work must be done to organize competition for expanding service zones.

The Smolensk scientific-research institute Tekhnopribor [Technical Instrument Engineering] is offering serious assistance in the improvement of production. Right now they are making adjustments on the first completely automated thermostat assembly line. It consists of 40 units of equipment. Manipulators will convey the assemblies.

What do the Orel people expect of the new line?

"Entirely independent production," says deputy chief technologist V. Starunov. "It will be serviced by about 90 people. The line will save the labor of about 300 workers."

And consider these eloquent figures: whereas the factory accounted for less than 10 percent of products of the high-quality category at the beginning of the five-year plan, today a distinguished pentagon marks nearly two-thirds. Labor productivity has increased by more than 50 percent.

Taganrog Robot Plant Described

Moscow EKONOMICHESKAYA GAZETA in Russian No 34, Aug 80 p 2

[Text] The resolution of the CPSU Central Committee "On measures to increase production and apply extensively automatic manipulators in sectors of the national economy in the light of instructions of the 25th CPSU Congress" emphasizes that one of the important trends in the effort to increase labor productivity and accelerate scientific-technical progress is comprehensive mechanization and automation on the basis of extensive application of automatic manipulators (industrial robots).

Mikhail Nikolayevich Khmel'nitskiy, director of the Taganrog Planning-Design and Technological Institute of Foundry Robot Engineering, told our correspondent what is being done right now to complete the assignments set forth in the resolution.

Industrial robots recently appeared in shops of certain Taganrog factories, in particular of a metallurgical shop at the "Krasnyy Aksay" cultivator factory in Rostov.

Dozens of organizations of different sectors of industry are engaged in the development of automatic manipulators. Among them is our institute. At the present time it is the only specialized organization in our country, called upon to solve problems of the development and adoption of automatic manipulators in foundry production. A lot of heavy physical and monotonous labor is still being done in this industry. Therefore about 37-40% of the automatic manipulators which we build are earmarked for use for automating technological processes in the forging and stamping industry.

Interest in industrial robots is attributed to technical, economic and social factors. Unlike traditional automation systems, manipulators have considerable flexibility and enormous functional capabilities.

The economic aspect is related basically to the improvement of labor productivity, product quality, machinery utilization efficiency, labor economy and improvement of labor conditions. For example, the use of two industrial robots with a lifting capacity of 40 kilograms in an automated hot stamping complex with a KA-8546 press saved about 200,000 rubles in 1 year. This is just for one complex!

The social aspect of the application of automatic manipulators consists in the fact that they free workers from heavy physical and monotonous labor.

Our institute is still young, a little older than 2 years. But in that time we have succeeded in doing something. We have developed technical documentation and have built consignments of six lines of automatic manipulators, intended for automating cold stamping processes. Technical documentation has been written up on 15 models of complexes and lines for automating cold stamping processes for making parts out of sheet blanks and for hot stamping operations.

Our collective recently presented to interdepartmental commissions models of our latest developments. All the products were awarded the high-quality category and are recommended for series production.

Considerable national economic importance is attached to the application of automatic manipulators in connection with a substantial expansion of their production. Some enterprises of the "Soyuzkuzmash" VPO [All-Union Industrial Association have already undertaken the production of the first complexes with industrial robots. At the Sal'sk foundry machinery plant, for example, automated complexes are being produced on the basis of two presses with industrial robots. This year the factory will manufacture 27 such complexes, and in 1985 production will increase 8-10-fold. By the end of the 11th Five-Year Plan enterprises of our industrial sector will build no less than 1,500 automatic manipulators on the basis of our developments.

This year alone the staff of the institute is supposed to draft 50 reports on the development and production of automatic manipulators and complexes, programmed control systems, and on the adoption of electronics in foundry machinery control. Work has started on the development of ChPU [digital program control] systems for foundry machinery, microprogrammed units and several systems of technical modes and parameters. Our institute has to build 18 automatic manipulators, 16 manually controlled manipulators and an automated complex on an experimental-industrial basis.

Even more substantial scopes and rates of the planning and production of robots are planned in the light of the requirements of the new resolution of the CPSU

Central Committee. The construction of a foundry robot engineering factory and of several other specialized plants is being anticipated. The staff of the institute is bending every effort to increase the productivity of our work and to provide the foundry industry of our country with dependable automation systems with manipulators.

And in conclusion I should like to say a few words about a sore point. Our institute still lacks the appropriate industrial base. I am talking about facilities for an engineering laboratory building and experimental test plant. The staff is growing, we are hiring new scientists and designers, and we are putting them to work in facilities that are not adapted to their jobs, much less the fact that they are scattered all over the city. USSR Minstankoprom [Ministry of Machine Tool-Building Industry] is not placing any limits on our resources, but it is very hard to find a common language in which to communicate with the construction organizations of USSR Mintyazhstroy [Ministry of Construction of Heavy Industry Establishments].

Last year Mintyazhstroy participated in a plan of the construction of an engineering laboratory building and experimental base, costing 1.3 million rubles. We signed a contract with trust No. 1 of Glavsevkavstroy, in which both parties bear the appropriate responsibilities. In particular, the staff of the institute, through its own efforts, demolished old buildings on a site allocated to us and turned the prepared site over to the builders.

However the unexpected happened: some time later USSR Mintyazhstroy refused to do the assigned work. We hope that with the resolution of the CPSU Central Committee, in which economic agencies that underestimate the importance of manipulators in the realization of comprehensive mechanization and automation of industrial processes are criticized, will resolve this problem quickly and affirmatively.

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METALWORKING EQUIPMENT

INDUSTRIAL APPLICATIONS OF ROBOTS

Robot Use Improves Quality

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Sep 80 p 2

[Article by R. Vladimirskiy, general director of "Temp" NPO, candidate of physico-mathematical sciences: "Automation to the Assembly Line"]

[Text] There is no machine-building sector in which assembly is not done. Moreover, assembly operations constitute one of the basic industrial processes. In our instrument engineering industry, for example, they comprise approximately one-half of the total labor. At the same time we assert with complete responsibility that assembly everywhere is one of the weak spots in the technical outfitting of shops. In our sector, for example, the average level of mechanization approaches 60%, while it is only about half of that on the assembly line. Tens and hundreds of thousands of assembly line workers are engaged right now in manual labor.

Thus, the problem is extremely acute today. And much attention is being devoted to it. We, for example, in addition to conventional equipment, are actively using modern and progressive machinery, such as automatic manipulators. They, in combination with other automatic systems, enabled us in the last 2-3 years to make literally a quantum leap, for example in the assembly of clocks. We will not go into detail about this, but our experience is quite well known in the clock industry. We will simply point out that as a result the shops that have adopted complexes with robots have increased labor productivity several fold and have improved assembly quality.

These complexes are being used right now in all enterprises of the clock industry. We should like to emphasize that automatic assembly lines which include good helpers -- manipulators -- are already beginning to be used in other Minpribor [Ministry of Instrument-Making] industries. The Orel "Prompribor" PO [Industrial association] is adopting an automated complex for assembling bellows, for which its developers -- a group of specialists at NIITekhnopribor [Scientific Research Institute of Instrument-Making Technology] and our very enterprise, like developers of machinery for clock factories, were awarded the USSR Government Prize. This complex will enable us to increase labor productivity and release hundreds of people.

Also important is the fact that the industrial base for automating assembly processes has been strengthened considerably in recent years. At enterprises of the "Soyuzchasprom" VPO [All-Union Industrial Association] for example, it has been possible through their well thought out specialization to organize the series production of standardized assembly units: conveyor systems, compact manipulators, vibration instruments, etc. This experience is being promulgated actively at the present time.

By virtue of this and of a whole list of other measures Minpribor has developed a rather long line of assembly mechanization and automation systems and has begun circulating them. The ratio of assembly machines that operate in the automatic mode has increased appreciably. And to even further expand the range of application of these automatic manipulators which have proved themselves so well, the industry has undertaken a complex program for their development which runs to the end of the next five-year plan. Some of the themes included in this program should be completed in a very short time. In particular NIITekhnopribor specialists are already working out robotized machinery complexes for sheet stamping. They are even solving successfully another problem that is important to our enterprises: they are building small robots which will perform auxiliary tasks on programmable milling machines. And the importance of this development is by no means limited to the fact that it solves one of the most urgent industrial problems. Another result will be the birth of new, so-called modular unit robots, manufactured from typical assemblies already available. This approach will make it possible to maximize the standardization of robots within the framework of a sector and to cut their production cost. In addition it will enable us to build from a limited set of elements a large number of modifications of automatic manipulators, intended for the most diverse industrial conditions.

In a word, if we are talking about the future, then we have a pretty good chance of correcting the situation on the assembly line. Meanwhile, given all of our accomplishments, we are hardly able to solve all of its problems. The problem is that instrument makers today, like specialists in other sectors who are trying to automate the assembly line, have to manage basically on their own. The fact is that practically no assembly line machinery is being built by the centralized approach, and therefore everybody has to meet the demand for it however he can. Our "Temp" NPO [Scientific Industrial Association] for example, which is the leading organization of the ministry in the field of development and production of technological machinery and hardward, has to deal with all of these problems. As a case in point, when we were taking inventory of the capabilities and resources of the sector, we found that even if we could activate all capabilities that could just be adapted to this effort, we could meet only half the demand of our enterprises for assembly line machinery.

On the other hand, even a cursory analysis of information and technical documentation which we receive from other sectors convincingly shows that the developers are duplicating each other in many cases and are building systems that are largely similar and intended for the same functions. A comparison disclosed that not one-tenth of the mechanisms, even after minimal modification, much less without it, could be standardized and made capable of satisfying different demands.

In brief, the most favorable prerequisites exist for the centralized production of assembly line machinery, or for more complete specialization of the sectors that are building it independently. We figured out that this will make it possible to reduce the existing shortage of special machinery and hardware by about half.

Characteristically, robot engineering is facing the same problems. Shortages related to duplication and the need for better coordination of efforts are specifically mentioned in the recent resolution of the CPSU Central Committee on expansion of production and extensive application of automatic manipulators. This again is convincing proof that the above-mentioned problems are common not only for new types of assembly systems, but also for conventional machines which have already become a familiar attribute of assembly automation. Consider a system like a vibration bunker. The demand is great, but centralized production has not yet started.

Incidentally, the requirement for more extensive application of the principle of aggregation in the production of robots, which is perfectly applicable to the entire assembly problem, is cited in the same resolution. The problem thus consists not only in organizing the production of individual types of systems, such as those used in a few sectors, but also in the standardization and undertaking of the extensive production of basic structural units for assembly machines and lines, including control units, conveyor structures, etc. The advantages of the aggregation of machinery are unquestionable. Experience shows that the cost of assembly machines, lines and hardware, manufactured with typical parts, is approximately 30-40% lower.

Of course, all of this can hardly be achieved without the appropriate scientific work. Moreover, before assembly can be steadily developed and perfected in the future we will have to conduct continuous, profound and goal-oriented investigations in this area. However, even here we have a tremendous flaw: the country still has no leading scientific research organization capable of coordinating all efforts on the mechanization and automation of assembly processes.

And, finally, we must emphasize in particular that we have already brought these questions time and again to the attention of USSR State Committee for Science and Technology and of USSR Gosplan. Everywhere we go they listen to us and agree that the problem must be solved, but that is as far as it goes. We do not deny that it is a difficult matter: ambitious studies, additional capacities and the corresponding scientific reorganization are necessary, which also involve considerable financial delays and take time. But eventually, even within the framework of the present, impressive results can be achieved. We not incidentally mentioned above the experience of the "Soyuzchasprom" VPO, which through thorough specialization of its enterprises was able to undertake the series production and to increase the production of systems that were only recently considered to be in short supply. Sectors that manufacture standardized assembly products can specialize in exactly the same way. All it takes is the appropriate effort on the part of USSR Gosplan and USSR State Committee for Science and Technology. The situation could be straightened out even in the very near future by conducting a comprehensive analysis of the assembly systems that have been developed and are being developed and by selecting from among them the ones that are most promising, the ones that meet different needs. And a determination will be made as to what must be done and who should do it, in order to undertake their production.

Pinsk Plant Manufactures Robots

Minsk SOVETSKAYA BELORUSSIYA in Russian 14 Sep 80 p 2

[Article by V. Biryukov: "Robots in the Casting Shop"]

[Text] The tester pushed a button on the console and one of the mechanical hands dipped into the pressing chamber to lubricate the mold. Another ladled a boiling silvery metal into the mold and a third removed the red-hot finished aluminum casting and dipped it in a cooling solution.

All these operations, taking place in the casting machine, took a few minutes. There was negligible human participation in them, and in fact no one was even near the hot and gassy zone.

This complex was shipped from Pinsk to an electrical engineering enterprise in this country. There it will help not only to release people from monotonous processes and improve labor conditions, but also to elevate labor productivity and improve the quality of castings.

This year the Pinsk casting machinery factory has delivered more than 150 such industrial robot manipulators to various sectors of the national economy, yielding an annual saving of 1.5 million rubles.

"It could be greater," says deputy plant director N. Brazinskiy. "Unfortunately we deliver the complexes on a noncentralized basis, and that means we have to advertise our products, convince the consumers of its advantages and delay the production of this progressive innovation. And this creates a paradoxical situation: enterprises have large modern casting machines, which are used unproductively because auxiliary processes connected with lubrication, teeming and removal of finished products are not mechanized. But the complexes built by our designers and colleagues from Odessa have demonstrated their cost effectiveness -- their application increases labor productivity by a factor of 1.6, reduces waste, enables the operator to service several machines and makes his labor more highly qualified and rewarding."

The resolution of the CPSU Central Committee "On measures to expand production and to apply extensively automatic manipulators in sectors of the national economy in light of instructions of the 25th CPSU Congress" undoubtedly will promote an increase in the production of the necessary products. This is especially important to us, because the designers, in cooperation with scientists, have developed new manipulators for larger and heavier castings. One of them is designed to handle 20-kilogram billets, has an electronic control system and performs several operations. The first consignment of these robots is already undergoing adjustments at the "Izhmash" industrial association, where parts will be cast for compact cars and motorcycles.

And after next year the factory plans to begin the series production of several models of mechanisms, which will clean large castings. Here, of course, the enterprise is assured of orders for 2 years in advance -- indeed the complexes guarantee a 7-8-fold increase in productivity in those operations, depending on the shape and size of the blank.

Other developments by the specialists, capable of automating and mechanizing out-of-machine pressure casting operations for both nonferrous and ferrous metals, are close to adoption. The staff of the young plant has great plans: even next year manipulators will account for 40% of the total production volume which is triple the present production level.

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METALWORKING EQUIPMENT

BRIEFS

ROBOTS IN PRODUCTION--Voronezh, 27 Sep--Only 3 years have passed since the industrial association on the production of foundry machinery imeni M.I. Kalinin embarked upon the industrial manufacture of automatic manipulators. They were supposed to service presses, stamping machines and forges built there. Since then the Voronezh people have shipped more than 100 robots to more than 40 enterprises around the country. Some of them have been awarded the government Seal of Quality. The first models of mechanical human helpers have been shipped to Chelyabinsk and Volgograd, Moscow and Minsk. Association specialists have developed a plan for future manipulator production. [Text] [Moscow PRAVDA in Russian 28 Sep 80 p 2] 7872

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